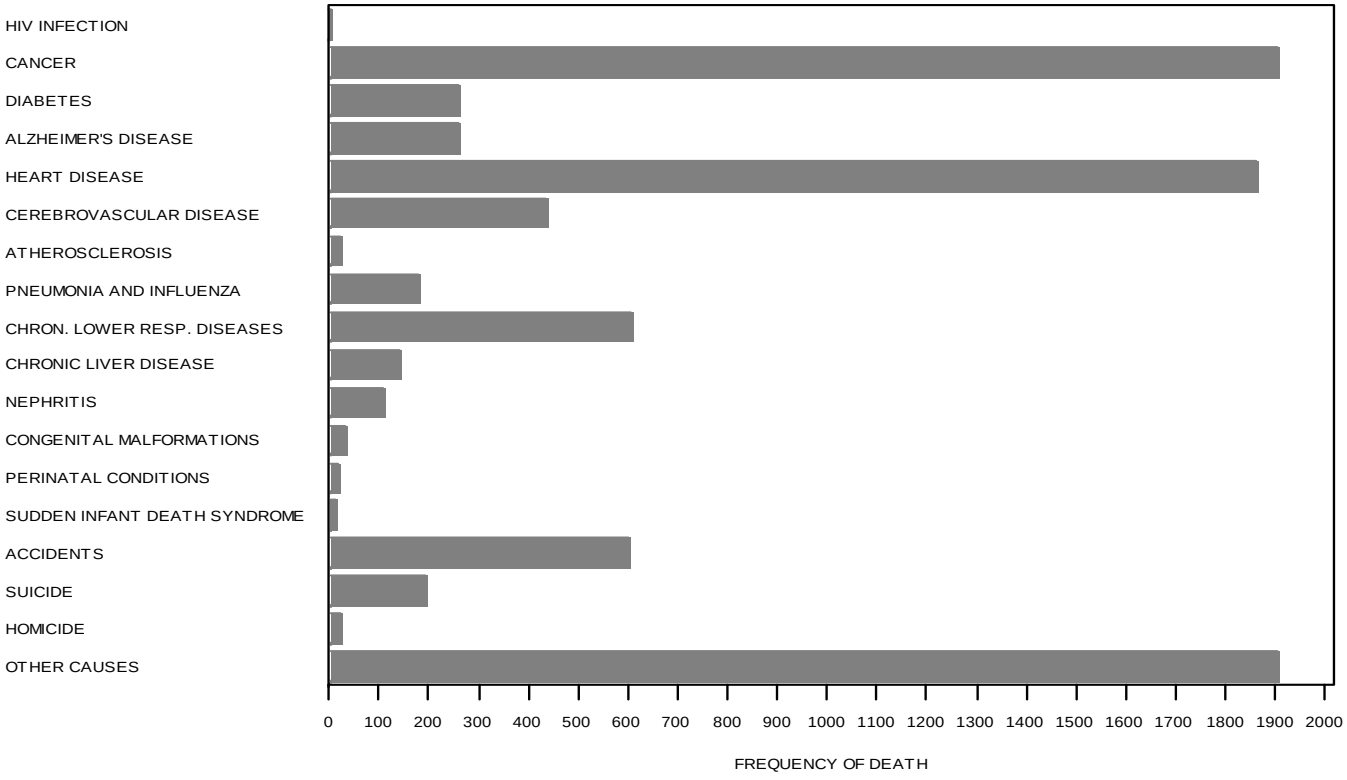
## YEARS OF POTENTIAL LIFE LOST

The more traditional approach to cause of death analysis relies on frequency of death. This perspective emphasizes causes of death that affect the elderly, simply because of the larger number of such deaths. Years of potential life lost (YPLL) is an alternative measure that highlights premature, preventable, and unnecessary mortality. There are a number of different calculations for YPLL, each with a slightly different emphasis. Here we use the "premature years of potential life lost" calculation, which is easily understood and is used by the Center for Disease Control and Prevention (CDC). For each decedent younger than 75, the age at death is subtracted from 75. The results are summed by cause of death. This measure is referred to here as YPLL-75.

Frequencies and crude population-based rates for the ten leading causes of death for Montana residents are reported in **Table S-5**. The ten leading causes of death, in order, are cancer (22.2% of all resident deaths), heart disease (21.7%), chronic lower respiratory diseases (CLRD) (7.1%), accidents (7.0%), cerebrovascular disease (5.1%) Alzheimer's disease (3.0%), diabetes (3.0%), suicide (2.2%), pneumonia and influenza (2.1%), chronic liver disease and cirrhosis (1.6%).

**Figure 45**

**FREQUENCY OF DEATH BY CAUSE OF DEATH**




**MONTANA RESIDENTS, 2007**

**Figure 45** represents the traditional view of cause of death analysis, showing the frequency, or number of deaths, in each cause of death category. Montanans of all ages who died of one of the listed causes in 2007 are reflected

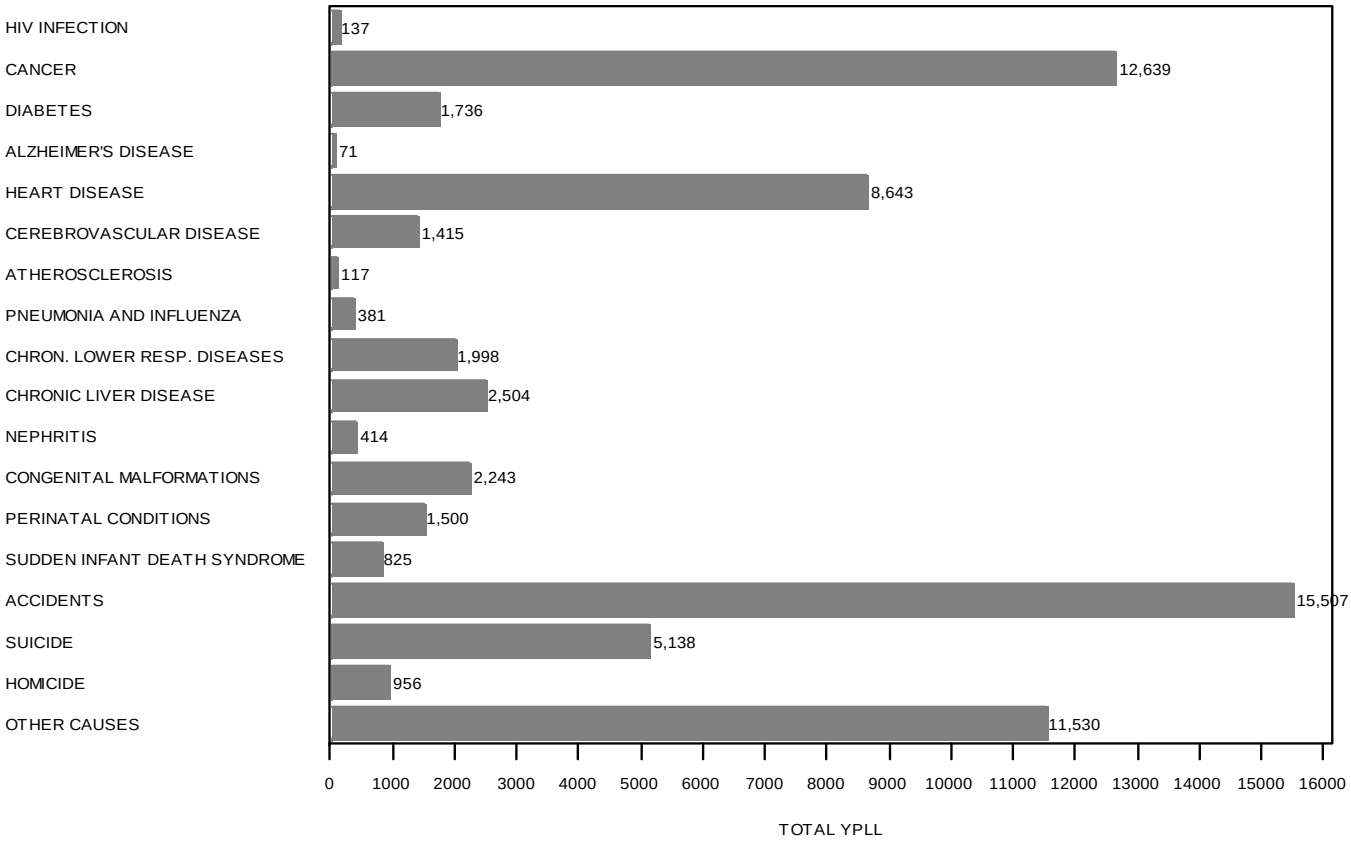
in this figure.

An alternative perspective, YPLL-75, is shown in **Figure 46**. Only decedents younger than 75 at the time of death are reflected in this figure

Accidents (both motor and non-motor-vehicle), homicide and legal intervention, and suicide comprise only 9.5% of the deaths in 2007 but accounted for 31.9% of the total losses as measured by YPLL-75. This disparity in proportions, with less than a tenth of the deaths accounting for nearly a third of all years lost, points to the disproportionately large cost (in terms of life lost) of the typical death from traumatic causes and emphasizes the many young people lost to such potentially preventable causes of death.

**Figure 46**

**TOTAL YEARS OF POTENTIAL LIFE LOST BEFORE AGE 75**
**BY CAUSE OF DEATH**
**MONTANA RESIDENTS, 2007**

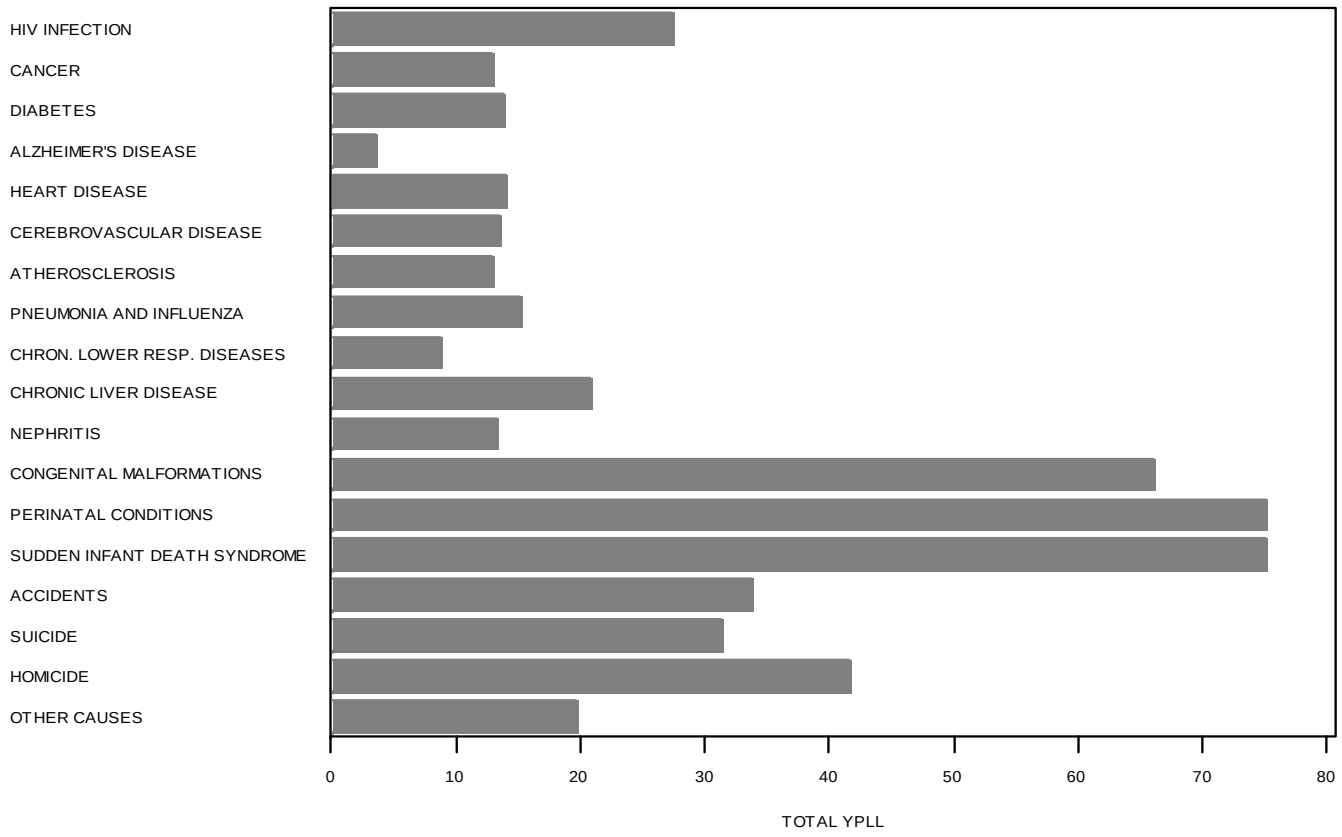


In 2007, the total loss of life before age 75 was 67,754 years. The loss to society resulting from cancer was 18.7% of all years lost. Accidental deaths of any type (motor and non-motor vehicle accidents) accounted for 22.9% of total YPLL, with motor vehicle accidents accounting for 13.3% and non-motor-vehicle accidents accounting for 9.6%. Heart disease also caused large losses to society, accounting for 8,643 years lost (12.8%). Other deaths due to traumatic injury such as suicide and homicide, accounted for 7.6% and 1.4%, respectively.

Regardless of which of these two perspectives is used, cancer and heart disease cause a large social loss because of the numbers of deaths they cause, both among decedents of all ages and those less than 75 years of age. In both cases many of the decedents were younger than 75 years of age at death. Nearly fifty-two percent of cancer victims were younger than 75. About a third of heart disease victims were younger than this age. The YPLL-75 perspective does reorder the ranking of the leading causes of death, highlighting areas the CDC has said "provide the greatest potential for health improvement." (Morbidity and Mortality Weekly Report, June 20, 1997). Frequency of accidental deaths (both motor and non-motor vehicle) was ranked 4$^{th}$ in cause of death by frequency but this cause of death is ranked 1$^{st}$ in terms of YPLL-75, indicating that accidental deaths are prevalent in those less than 75 years of age and cause great losses to society due to premature death. Suicide ranked 8$^{th}$ by frequency, but became the 4$^{th}$ leading cause when measured by total YPLL-75.

**Figure 47**

**AVERAGE YEARS OF POTENTIAL LIFE LOST BEFORE AGE 75**
**BY CAUSE OF DEATH**




**MONTANA RESIDENTS, 2007**

Average YPLL-75 is calculated by dividing the total YPLL-75 for each cause of death by the number of decedents less than 75 years of age. While total YPLL-75 emphasizes the loss to society in terms of years of lost life, average YPLL-75 emphasizes the loss to the individual. This measure is shown in Figure 47 on the previous page.

**Figure 48**

**AGE AT DEATH AND YEARS OF POTENTIAL LIFE LOST BEFORE AGE 75**
**BY CAUSE OF DEATH**
**CENTRAL TENDENCY AND DISPERSION***
**MONTANA RESIDENTS, 2007**

| CAUSE OF DEATH | AVERAGE YPLL - 75 | NUMBER OF DECEDENTS YOUNGER THAN 75 | TOTAL YPLL – 75 | MINIMUM AGE | MEAN AGE | MEDIAN AGE | MAXIMUM AGE | STANDARD DEVIATION | NUMBER OF DECEDENTS OF ALL AGES |
|---|---|---|---|---|---|---|---|---|---|
| ALL CAUSES | 19.0 | 3,562 | 67,754 | 0 | 73.3 | 78 | 111 | 18.7 | 8,570 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **CONDITIONS ORIGINATING IN PERINATAL PERIOD** | 75.0 | 20 | 1,500 | 0 | 0 | 0 | 0 | 0 | 20 |
| **SUDDEN INFANT DEATH SYNDROME** | 75.0 | 11 | 825 | 0 | 0 | 0 | 0 | 0 | 11 |
| **CONGENITAL MALFOMATIONS & CHROMOSOMAL ANOMALIES** | 66.0 | 34 | 2,243 | 0 | 9 | 0 | 70 | 20.5 | 34 |
| **HOMICIDE** | 41.6 | 23 | 956 | 17 | 33.4 | 27 | 60 | 13.8 | 23 |
| **ACCIDENT** | 33.8 | 459 | 15,507 | 0 | 51.9 | 51 | 102 | 24.7 | 603 |
| **SUICIDE** | 31.3 | 164 | 5,138 | 13 | 49.5 | 49 | 92 | 19.4 | 192 |
| **HIV INFECTION** | 27.4 | 5 | 137 | 37 | 47.6 | 51 | 53 | 7 | 5 |
| **CHRONIC LIVER DISEASE AND CIRRHOSIS** | 20.9 | 120 | 2,504 | 23 | 57.8 | 56 | 98 | 13.1 | 139 |
| **INFLUENZA AND PNEUMONIA** | 15.2 | 25 | 381 | 0 | 84.1 | 86 | 105 | 13.3 | 180 |
| **HEART DISEASE** | 14.1 | 614 | 8,643 | 0 | 77.9 | 82 | 111 | 14.3 | 1,860 |
| **DIABETES** | 13.9 | 125 | 1,736 | 20 | 72.9 | 76 | 97 | 14.2 | 258 |
| **CEREBROVASCULAR DISEASE** | 13.5 | 105 | 1,415 | 0 | 80.4 | 84 | 101 | 13 | 437 |
| **NEPHRITIS, NEPHROTIC SYNDROME & NEPHROSIS** | 13.4 | 31 | 414 | 17 | 79.2 | 83 | 99 | 14 | 109 |
| **ATHEROSCLEROSIS** | 13.0 | 9 | 117 | 50 | 77.5 | 78 | 103 | 14.5 | 24 |
| **CANCER** | 12.9 | 983 | 12,639 | 1 | 72.4 | 74 | 106 | 13.4 | 1,906 |
| **CHRONIC LOWER RESPIRATORY DISEASES** | 8.7 | 229 | 1,998 | 2 | 76.8 | 78 | 103 | 10.6 | 604 |
| **ALZHEIMER'S DISEASE** | 3.6 | 20 | 71 | 64 | 86.5 | 88 | 103 | 7.1 | 260 |
| **OTHER CAUSES** | 19.7 | 585 | 11,530 | 0 | 77 | 82 | 108 | 17.9 | 1,905 |

* The *mean* is the arithmetic average and the *median* is the midpoint. The *standard deviation* measures the concentration of the distribution around the mean.

The categories “conditions originating in the perinatal period” and “sudden infant death syndrome” showed the greatest average loss to an individual (75 years lost) followed by “congenital malformations and chromosomal anomalies (66 years). Traumatic causes of death--including homicide and legal intervention (41.6 years lost), motor vehicle accidents (36.1 years lost), suicide (31.3 years lost) and non-motor-vehicle accidents (31.0 years lost)—occupied the next four highest ranks.

**Figure 48** on the previous page summarizes average and total YPLL-75, frequency of death, and age at death in tabular form for selected causes of death. The left side of the table shows YPLL-75 and related measures for decedents less than 75 years of age at the time of death. The right side of the table shows statistics referring to all decedents, regardless of age.

Specific causes of death are shown in descending order of average years of life lost before age 75. In general, average YPLL-75 was high when median age was low. For instance, victims with Alzheimer’s had the lowest associated average YPLL-75, 3.6 years per decedent younger than 75, and the highest median age, 88.0 years, among all the specified causes.

There were several exceptions, however, because average YPLL-75 is influenced by both the age at which decedents died and the number of decedents under age 75 in the cause-of-death category in question. Average YPLL-75 was highest for those dying of conditions arising in the perinatal period. This is not surprising, since such decedents generally die in infancy or early childhood. Compared to the numbers who died of cancer (1,906) or heart disease (1,860), relatively few residents died of conditions arising in the perinatal period. However, all 20 of these decedents died with in the first year of life and each contributed the maximum number of years (75) to total YPLL-75.

Although YPLL has significant advantages for analyzing mortality data from a public health perspective, it has a decided disadvantage in that some data—the records of the older decedents—are excluded from the analysis. More than half of the decedents who died from influenza and pneumonia, nephritis, heart disease, diabetes, cerebrovascular disease, chronic lower respiratory disease, atherosclerosis, and Alzheimer’s are excluded from YPLL-75 analysis. While YPLL highlights those causes of death having the greatest impact on the younger members of the population, it does so at the cost of diverting attention from the causes of death affecting older members.